



safr

SCIENCE
APPLICATION
FOR RISK
REDUCTION



During paleowildfire fieldwork by SAFRR's Robert Leeper, CSUF Professor Matthew Kirby and undergraduate student Jeremy Cordova return to the shore of Crystal Lake after stabilizing a coring platform. (Photo: Robert Leeper, USGS)

Updates on USGS SAFRR team's spring-summer 2014 activities

Since our last newsletter, the USGS SAFRR team has engaged in a number of workshops and outreach activities, continued partnerships and field work, and been mentioned in the press.

Highlights of our activities include the release of new SAFRR products with the publishing of SAFRR Tsunami Scenario Paleotsunami chapter and the California Tsunami Policy Work Group Report. We have also developed a USGS Fact Sheet on earthquake early warning. The SAFRR Tsunami Sce-

nario made an impact with its release and was used in presentations and exercises especially throughout Tsunami Preparedness Week. Efforts to improve understanding and use of the USGS National Seismic Hazard Maps are also now underway after a recent SAFRR CORE workshop.

Further details and updates are outlined in this newsletter and on our SAFRR website:

http://www.usgs.gov/natural_hazards/safrr/

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Spring - Summer 2014



The mission of the USGS SAFRR (Science Application for Risk Reduction) Project is to innovate the application and development of hazards science to protect the safety, security and economic well-being of the Nation. SAFRR is available to work with interested USGS colleagues to enhance applications of their science. SAFRR offers a wide range of experience in user-focused research, targeted messaging, and partnerships with social and behavioral sciences relevant to hazards science.

New Hazard Scenarios Post on AGU's "The Bridge" Blog

AGU's science policy blog "The Bridge" (<http://thebridge.agu.org/>) featured guest posts by speakers at the June 17-18 AGU Science Policy Conference in Washington, DC. SAFRR staff scientist Kris Ludwig authored a post entitled, "Hypothetically Speaking: Using Scenarios to Anticipate the Unanticipated," which addresses different types of scenarios and how they are developed and used by multiple stakeholders. The Bridge is an AGU blog that connects science and policy, providing a platform for scientists, policy makers, and experts to communicate ideas about the science policy interface.

The post is available at:

<http://thebridge.agu.org/2014/06/10/hypothetically-speaking-using-scenarios-anticipate-unanticipated/>.



Scenario Panel at the Annual Natural Hazards Research & Applications Workshop

Kris Ludwig convened a panel on hazard scenarios at the Annual Natural Hazards Research and Applications Workshop held June 23-25, 2014 in Broomfield, CO (<http://www.colorado.edu/hazards/workshop/current.html>). Shaped by discussions with SAFRR team members, the panel explored different approaches to creating scenarios and disseminating and implementing scenario results. Panelists included University of Colorado Research Professor Keith Porter, FEMA Response Director Justin Dombrowski, and FedEx Express Senior Manager for Global Operations Control Dave Lusk. The Hazards Workshop, in its 39th year, brought together researchers and practitioners from many disciplines for face-to-face discussions on how society deals with hazards and disasters.

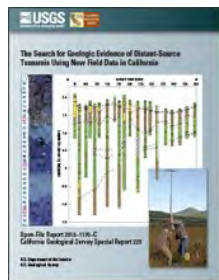
Tsunami Scenario at SSA

SAFRR tsunami project manager Stephanie Ross co-chaired a special session at the Seismological Society of America meeting (April 30-May 2 in Anchorage, Alaska) on "Fifty Years of Tsunami Science: from the 1964 Earthquake and Tsunami to the SAFRR Tsunami Scenario - Advances in Tsunami Source Characterization, Numerical Analysis and Hazard Mitigation." Co-chairs were Elena Suleimani and Dmitry Nicolsky (both at U. Alaska Fairbanks) and Hong Kie Theo (URS Corps.). Stephanie also presented "The SAFRR Tsunami Scenario: Improving Resilience for California from a Plausible M9.1 Earthquake near the Alaska Peninsula."

Press Release and Report Now Available for Paleotsunami Chapter of SAFRR Tsunami Scenario

The paleotsunami chapter of the SAFRR Tsunami Scenario Open-File Report has been published. The press release and link to the report online can be found at:

<http://www.usgs.gov/newsroom/article.asp?ID=3896#.U3urJV4Y8fw>.



The chapter, titled "The Search for Geologic Evidence of Distant-Source Tsunamis Using New Field Data in California," is the most comprehensive paleotsunami investigation ever conducted in California. Rick Wilson from the California Geological Survey coordinated the group with participants from Humboldt State University, the USGS, the University of New South Wales, and the California Dept. of Water Resources. Robert Leeper, Masters student with SAFRR is a co-author on the report and worked at nearly all of the field sites collecting sediment core and describing the stratigraphy with the purpose of identifying paleotsunami deposits.

Ongoing Haywired Scenario Development

SAFRR's Dale Cox and Erin Burkett attended a meeting in Menlo Park, CA on March 21st for the Haywired Project to help prepare the San Francisco Bay Area for a possible quake on the Hayward fault. The meeting brought together USGS scientists, engineer Keith Porter who was part of previous scenarios, and representatives from utilities, communication, and transportation including EBMUD, CISCO, and BART. Outcomes included better recognition of limitations and modeling capabilities in moving forward to build the Haywired scenario.

HayWired meeting with Google in San Francisco

SAFRR project manager Dale Cox, Anne Wein (USGS Western Geographic Science Center), and Keith Porter (University of Colorado) visited Google in San Francisco on April 14th to discuss the SAFRR HayWired Project, which examines infrastructural impacts in the San Francisco Bay Area from a M7.0 on the Hayward Fault. The HayWired project will focus on impacts to the Internet economy and Silicon Valley.

California Tsunami Policy Work Group: Completion of Report

The California Tsunami Policy Work Group finished its report on tsunami policy. The group formed to both create a chapter identifying policy issues for the SAFRR Tsunami Scenario and to separately develop a set of policy recommendations to be issued by the committee.



The report and its press release are available on the web site for the Western States Seismic Policy Council at: <http://www.wsspc.org/california-tsunami-policy-working-group-report/>.

Tsunami Workshop at Long Beach Propeller Club

SAFRR Tsunami Scenario team members Anne Wein (USGS), Rick Wilson (California Geological Survey) and Kevin Miller (California Governor's Office of Emergency Services) presented a workshop for the Long Beach Propeller Club on tsunami hazard mitigation on June 13th. The workshop included results from the SAFRR Tsunami Scenario, with speakers coordinated by SAFRR's Stephanie Ross. The Long Beach Propeller Club, whose members are largely maritime industry professionals, is considered a highly influential group for the Ports of Los Angeles and Long Beach.

SAFRR Tsunami Scenario Now Part of Tsunami Preparedness Week

The SAFRR Tsunami Scenario was used for the 50th Anniversary of the Great Alaska Earthquake and became part of Tsunami Preparedness Week. On March 24th, Tsunami Scenario team members Lucy Jones, Patrick Lynett, and Rick Wilson presented for a public event about tsunamis at the Aquarium of the Pacific (see http://www.aquariumofpacific.org/events/info/tsunami_awareness_and_preparedness_meet_the_experts/).

On March 27th Lucy Jones presented in Marina del Rey at the Los Angeles County Operational Area Tsunami Seminar on the SAFRR tsunami scenario with several State officials on the California tsunami program.

NIH Emergency Exercise Uses Tsunami Scenario

On April 7th, the National Institutes of Health (NIH) held a tsunami disaster research response exercise in Long Beach based on the SAFRR Tsunami Scenario, with the inclusion of a fire at an oil refinery. A webex on March 24th set the stage with talks by Geoff Plumlee (USGS) and SAFRR's Stephanie Ross. Preparations also included meetings in Sacramento and southern California with State and local agencies.

..... RISK PERCEPTION & COMMUNICATION

Risk Communication and Disaster Preparedness at 2014 AGU Science Policy Conference

Kris Ludwig and former SAFRR Strategy and Communications Officer John Bwarie discussed risk communication and disaster preparedness during a panel discussion at the 2014 American Geophysical Union (AGU) Science Policy Conference (<http://spc.agu.org/2014/>) on June 17th in Washington, DC. Held every year, the AGU Science Policy conference convenes scientists, policy makers, and community leaders to discuss solutions to urgent challenges based on experience and relevant data from multiple perspectives. This year's conference included discussions of the science, policy, and communication of three tracks: natural hazards, climate change, and natural resource challenges.

<http://spc.agu.org/2014/event/disaster-preparedness-communicating-risk/>

The First SAFRR CORE Workshop: New Audiences, New Products for the National Seismic Hazard Maps

SAFRR disaster scientist Sue Perry organized a workshop that united USGS scientists with leading researchers in risk perception and communication to discuss ways to expand the use and understanding of the National Seismic Hazard Maps ("the Maps"), a flagship product that helps to save lives and protect property through use in international building codes, insurance modeling, and policy decisions. Currently, primary users of the Maps are building code engineers, but the Maps and their underlying information have potential value for many other groups, such as city leaders, re-insurers, and state geologists.

The workshop, held June 26-27 in Denver, Colorado, launched a multi-year collaboration to develop new Maps products that will serve new Maps audiences. Workshop participants shared

knowledge from some twenty fields of expertise – widely ranging from geophysics to socio-linguistics to design to urban planning – prioritizing new audiences, brainstorming products, and identifying strategies to work with new users and support development of new products.



Presenting Earthquake Science to Americorp Volunteers

SAFRR staff scientist Erin Burkett presented on "Earthquakes: Science, Monitoring, and Impacts" at the Bureau of Land Management (BLM) Barstow Field office on March 18th. The audience included local BLM employees and a group of about fifteen National Civilian Communications Corps (NCCC) volunteers, a subset of Americorps. The volunteers were signed up to help build a fence as part of upgrades and installments for seismic station improvements toward Earthquake Early Warning system development plans. The group had requested a presentation to inform the volunteers, who are not of geoscience backgrounds, of the context of their work. In her presentation, Erin covered an introduction to seismology, the science and potential impacts of earthquakes, and also highlighted student job opportunities within the USGS.



Erin Burkett and USGS Technician Dave Sutton open and show NCCC volunteers an active seismic station near Barstow, CA. (Photo: Joan Patrovsky, BLM)

Distinguished Lectureship at Tohoku University

Lucy Jones was invited to give a week-long series of lectures at Tohoku University in Sendai, Japan May 25-31 as part of a new lecture series, "Understanding and mitigating natural disasters: Lectures on the Science of Global Geohazards," supported by the national Leading School Program. Lecturers were all non-Japanese and the lectures were given in English. The audience consisted of graduate students in applied geoscience,

engineering, and the social sciences who will likely choose career directions in government and the private sector in hazard mitigation rather than in science research.



SAFRR's Debbie Weiser visits a geothermal turbine generator at the Geysers geothermal field, one of the sites where her induced seismicity research is based.

SAFRR Student Research at the Seismological Society of America Annual Meeting

SAFRR Ph.D. candidate geologist Debbie Weiser presented a poster, "Geothermal Pumping and Induced Seismicity in California Geothermal Fields," at the Seismological Society of America Annual Meeting in Anchorage, Alaska April 30-May 2. Debbie's poster outlined her work, applying a set of pre-existing criteria to California's geothermal fields to determine if earthquakes may have been induced by man-made activities. Debbie's results suggest that the criteria may need modification in order to be applied in California where natural earthquakes occur frequently.

Participation in 21st Century Infrastructure and Innovation for a Resilient Economy Forum

Lucy Jones was keynote speaker for a NIST (National Institute of Standards and Technology) conference on Lifelines and Disaster Resilience in Oakland, CA on May 7-8. Lucy presented the lecture "Imagine America without Los Angeles: Earthquakes, Lifelines, and the Complexity of Modern Society." The conference addressed the need for lifelines research and implementation in response to goals

prioritized in the Strategic Plan for the National Earthquake Hazards Reduction Program (NEHRP), which includes guidelines for earthquake-resilient lifeline components and systems. The conference brought together representatives of lifeline operators, users, designers, and regulators from across the nation to provide feedback on a draft 10-year plan for NEHRP activities toward improving the earthquake resilience of lifelines.

Visioneering session for the XPRIZE

On May 16-17, Lucy Jones led the Disaster/Prediction/Relief/Resilience session of this year's "Visioneering" for the XPRIZE (<http://www.xprize.org/visioneering>), held at the Terranea Resort near Los Angeles, CA. The event is a yearly gathering of over 100 corporate leaders, philanthropists, innovators, and XPRIZE Trustees for a multi-day Visioneering to discover and debate the "Grand Challenges" facing humanity and to consider how XPRIZE competitions could solve them. Attendees tackle some of the world's toughest problems to inspire potential XPRIZE competitions, and winning concepts are taken into a design phase.

As the session leader, Lucy gave a talk on the biggest challenges and opportunities in disaster, prediction, relief, and resilience, and then guided, in partnership with an XPRIZE facilitator, a breakout session with other attendees to discuss this field's "prizeable" areas.

For 2014 Visioneering Finalist "Demedicalizing Water" go to: https://www.youtube.com/watch?v=dz2OuF_molk.



Lucy Jones presents XPRIZE Visioneering Finalist "Demedicalizing Water" with teammate Patricia Arquette (link to video in text above).

Presenting Earthquake Science to InSight Educators

On July 2nd, Erin Burkett presented as part of a training program for InSight (Interior exploration using Seismic Investigations, Geodesy, and Heat Transport), a NASA Jet Propulsion Laboratory Discovery Program mission engaging science educators in the "Vital Signs of the Planet" Professional Development Program (<http://www.scec.org/education/k12/insight/application.php>). Erin led a tour of the Caltech Seismological Laboratory's Earthquake Exhibit, using demo seismometers and a displayed sample cross-section of the San Andreas fault to explain how seismometers work and how information gathered through geologic field work is pulled together to understand earthquakes. Erin also provided background on seismological networks, earthquake early warning developments, and resources available through the USGS and Caltech partners.



Erin Burkett explains the inner workings of seismometers using display pieces in the Caltech Seismological Laboratory's Earthquake Exhibit. (Photo: Bernadette Vargas, EHS)

SAFRR Outreach to Kindergarten Students

Debbie Weiser spoke to an enthusiastic group of kindergarteners at 24th Street Elementary school in Los Angeles on April 10th. She read a book about earthquakes, demonstrated a seismic wave experiment, and answered a plethora of questions about earthquakes and emergency preparedness. The class made their own earthquakes by standing up and shaking, and practiced a Drop, Cover, and Hold on drill.

PARTNERSHIPS

Advising the City of Los Angeles on Earthquake Vulnerabilities

SAFRR has entered a technical assistance agreement with the City of Los Angeles to create recommendations for approaches that could reduce future losses from earthquakes in the City of Los Angeles in four areas. These areas were identified in the ShakeOut Scenario (Jones et al., 2008) as areas of particular vulnerability with high social consequences for Los Angeles and are:

- 1) pre-1975 non-ductile reinforced concrete buildings;
- 2) pre-1997 soft-first-story buildings;
- 3) the water system infrastructure including its impact on firefighting capability; and
- 4) communications infrastructure.

In each area, the project defines the scope of the problem, engages stakeholders of Los Angeles to consider approaches to reducing the problem and develop policies, engages experts as necessary to address technical constraints to the possible approaches, and finally creates recommendations for the Mayor of Los Angeles on what can be done to reduce the impacts of these vulnerabilities. To accomplish these goals, Lucy is spending three-quarters of her time in 2014 on this project.

Addressing the City of Los Angeles on Seismic Retrofitting for Economic Resilience

On Thursday, March 20th, Lucy Jones met with 50 representatives of the Urban Land Institute for a "Meet and Greet with Lucy Jones - Seismologist to the City of Los Angeles" to discuss the LA project (<http://la.uli.org/event/meet-greet-with-lucy-jones/>).

FIELD WORK

Debris Flow Monitoring

SAFRR M.S. student geologist Robert Leeper has been helping maintain rain-fall gages in recently burned areas of Southern California as part of debris flow monitoring work supporting the Landslide and Debris Flow team out of Golden, Colorado.



During post-storm debris flow reconnaissance within the Colby fire burn perimeter, Robert Leeper identifies rafted debris (top of downed tree) and scour marks (underside of downed tree) produced by a debris flow. (Photo: Dennis Staley, USGS)

Paleoseismology Along the Newport-Inglewood Fault Zone

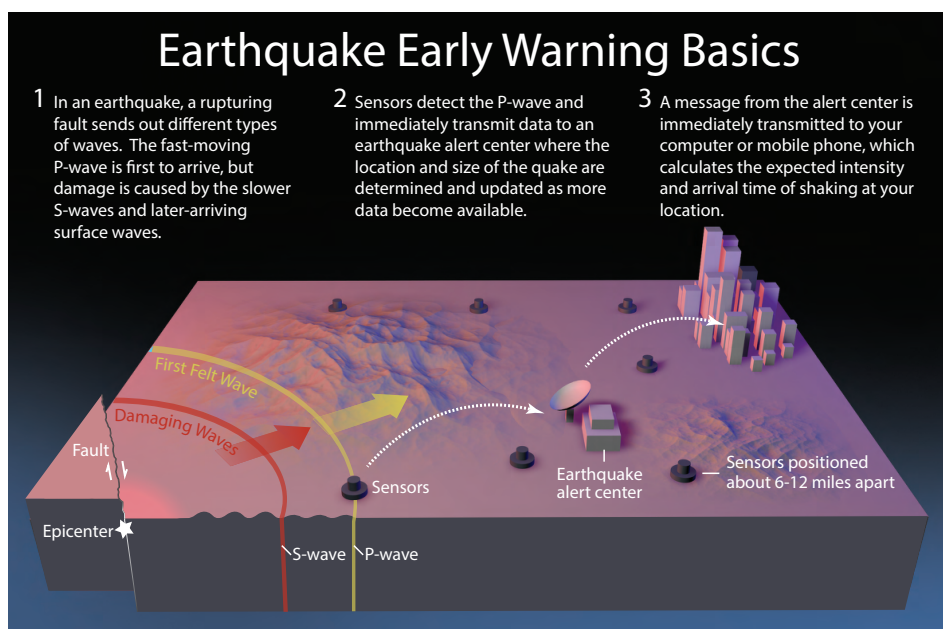
Robert Leeper is continuing work that may lead to a better understanding of late Holocene seismicity along the Newport-Inglewood fault zone. Multiple sediment cores taken from the Seal Beach wetlands have shown organic-rich sediment at greater than 2 meters depth. Robert's hypothesis is that the organic-rich sediment represents the relic marsh surface that abruptly subsided during a major earthquake approximately 1800 years ago. Next steps include identification of exotic pollen and determination of the depth at which Cs-137 spikes, which will help establish an age model for the marsh sediment. Microfossil analyses near 200-cm depth will also help determine if an abrupt change in the depositional environment occurred in the past.

EEW

Coming Soon: USGS Fact Sheet on Earthquake Early Warning

SAFRR staff scientist Erin Burkett has worked closely with USGS Earthquake Early Warning Coordinator Doug Given and the SAFRR team to create a draft USGS Fact Sheet on Earthquake Early Warning (EEW) and ShakeAlert (www.shakealert.org), the prototype EEW system in development for the western United States. The fact sheet provides fundamentals of the science behind how EEW works and describes the current status and future plans and potential uses of ShakeAlert for the west coast.

To illustrate the science and components involved in an EEW system, Erin collaborated with a graphics design staff member of the Orange County Register to merge scientifically accurate elements of EEW with visually engaging graphic design for the figure below. The draft document, titled "ShakeAlert: An Earthquake Early Warning System for the United States West Coast," has been submitted for publication as a USGS Fact Sheet.



Graphic developed for explaining basics of earthquake early warning, in collaboration between Jeff Goertzen of the Orange County Register and Erin Burkett of the USGS SAFRR team.

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SAFRR WEBSITE:

Please visit our website at:

http://www.usgs.gov/natural_hazards/safrr/

For comments on or problems with the site, new subscribers to our newsletter, or questions about SAFRR, please contact safrr@usgs.gov.

We appreciate your interest!

- the SAFRR team

The SAFRR staff are:

Lucy Jones, Science Advisor for Risk Reduction

Dale Cox, Project Manager

Suzanne Perry, Disaster Scientist

Erin Burkett, Staff Scientist

Stephanie Ross, Tsunami Project Manager

Kristin Ludwig, Staff Scientist

Sandra Dedeaux, Program Analyst

Robert Leeper, M.S. Student Geologist (Cal State University, Fullerton)

Debbie Weiser, Ph.D. Candidate Geologist (University of California, Los Angeles)



MEDIA MENTIONS

An increase in press coverage this Spring has been a consequence of SAFRR's Partnership with the City of Los Angeles, together with recent earthquakes felt in the LA area that also stirred up media attention to earthquake topics. A Few highlights follow:

WIRED

The Woman on a Quest to Protect L.A. From the Next Big Quake

6/5/2014

<http://www.wired.com/2014/06/seismologist-lucy-jones/>

"Lucy Jones wants to keep Los Angeles from falling apart....She'll spend 2014 as science adviser to the mayor, dedicated to protecting the city during a big quake....Jones is looking at developing a seismic safety rating system for buildings and mandating retrofits of the worst ones. Another big priority: water. She wants to clean up contaminated groundwater sources, which would reduce dependence on potable H2O from outside the region.



Lucy Jones appears in WIRED magazine.

FOX News

Magnitude 4.2 earthquake shakes parts of Los Angeles

6/2/2014

<http://www.foxnews.com/us/2014/06/02/magnitude-42-earthquake-shakes-parts-los-angeles/>

"Dr. Lucy Jones of the USGS told KNX-AM that the shaking was felt by a lot of people because the earthquake was so shallow. It was felt by many people because it happened in a densely populated area, Jones said. 'But seismically it's not a big deal.'"

Mail Online News

The man who says he's worked out how to PREDICT earthquakes and says the next one to hit U.S. will be on July 12

6/1/2014

<http://www.dailymail.co.uk/news/article-2645369/Author-claims-able-predict-earthquakes-says-one-U-S-July-12.html>

"Mr. Nabhan suggests there is fairly solid evidence to support the hypothesis that solar and lunar tides working in tandem might actually have a hand in at least helping to trigger

tremors on the West Coast. However, U.S. Geological Survey seismologist Lucy Jones is more wary about predicting such earthquakes. 'There's a very slight correlation. Not enough to predict any earthquake out of it,' she told CBS Los Angeles said. 'People try to make patterns out of anything that scares them. We haven't found anything that looks different before a big earthquake than other times.'"

Western San Fernando Valley News

Another Small Quake Hits South of Encino

6/1/2014

<http://www.postperiodical.com/another-small-quake-hits-south-of-encino/>

"When asked if having so many earthquakes in such a short span was a sign of bigger things to come, Jones wrote, 'Maybe and maybe not. No way to tell until it happens.'"

KTLA 5 Morning News

California Drought & Earthquakes With Dr. Lucy Jones

5/21/2014

VIDEO: http://video.ktla.com/California-Drought-Earthquakes-With-Dr-Lucy-Jones-26140157?playlistid=11925#_U6N-ByRZIkfw

"World Renowned Seismologist Dr. Lucy Jones joined us live to talk about a few recent studies about Southern California faults."

Fox News

Experts predict a death toll in thousands if 7.5 magnitude quake strikes LA

5/13/2014

<http://www.foxnews.com/us/2014/05/13/experts-predict-death-toll-in-thousands-if-75-magnitude-quake-strikes-la/?intcmp=obnet-work>

" 'The earthquake is inevitable. The only question is when,' said Lucy Jones, a seismologist with the U.S. Geological Survey. 'It might not be another 50 years. Maybe even 100. Chances of us making it through the 21st century without the earthquake is very small.'"

Pasadena Star-News

4/21/2014

Caltech earthquake forum to address concerns about the 'big one'

<http://www.pasadenastarnews.com/science/20140421/caltech-earthquake-forum-to-address-concerns-about-the-big-one>

"Lucy Jones, U.S. Geological Survey seismologist, and Tom Heaton, Caltech seismologist, will lead KABC's 'A Townhall Meeting: The Big Quake Threat is Real,' a free question and answer session beginning at 7 p.m. Tuesday at The Cahill Center on the Caltech campus."

NBC Los Angeles

4/9/2014

Ask an Earthquake Expert Anything

<http://www.nbclosangeles.com/news/local/Lucy-Jones-USGS-Earthquake-Reddit-254547791.html>

"USGS seismologist Dr. Lucy Jones will answer questions from Reddit users Wednesday about the recent earthquakes in Southern California and what residents can do to prepared for the next one."

Direct link to Reddit online bulletin board can be found at:

http://www.reddit.com/r/LosAngeles/comments/22m94y/i_am_dr_lucy_jones_usgs_seismologist_earthquake/



Insurance News Net

3/28/2014

House Natural Resources Subcommittee on Indian and Alaska Native Affairs Hearing

http://insurancenewsnet.com/oarticle/2014/03/28/house-natural-resources-subcommittee-on-indian-and-alaska-native-affairs-hearing-a-481340.html#_U6M_-l1dVA6

"Scenarios have proven to be powerful tools for making earthquake hazards real to people ahead of a disaster. For example, last September the USGS released the SAFRR (Science Application for Risk Reduction) Tsunami Scenario report."

OC Weekly

3/27/2014

County Passes Along Tsunami Survival Tips

http://blogs.ocweekly.com/navelgazing/2014/03/huntington_beach_tsunami_earth.php

" 'If you live in Huntington Beach, and especially along the coast there, you'd be wise to figure out a quick route to reach higher ground.' That's the advice of Lucy Jones, Southern California media's go-to expert on earthquakes and tsunamis. Jones, who is with the United States Geological Survey (USGS), spoke at the Aquarium of the Pacific in Long Beach Monday night as part of National Tsunami Preparedness Week."

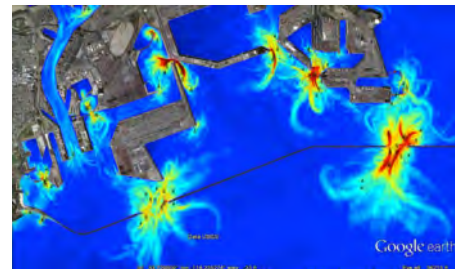
Hermosa Beach Patch

Earthquake Experts Talk Tsunamis

3/24/2014 by Penny Arévalo

<http://hermosabeach.patch.com/groups/around-town/p/earthquake-experts-talk-tsunamis>

" 'Knowing what to do when you hear that warning is essential to anyone that ever visits the beach,' Lucy Jones, who studies earthquakes and tsunamis for the United States Geological Survey, said at a special event at the Aquarium of the Pacific in Long Beach tonight."



Maximum current speeds for Ports of LA and Long Beach in the SAFRR Tsunami Scenario.